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The lowlands area is presented under the following formations: dune, muddy salt marsh, rocky headlands, aquatic, and peat moor. The section given to a consideration of the upland area contains an account of the plant formations of the sandstones, the limestones, the deep marls and clays, and the region of cultivation. The history of the plant formations is traced, it being shown that a plant formation begins as an open or unstable association, passes through intermediate associations, and eventually becomes a closed or stable association. For example, the dune formation in this region begins as an open association, either of strand plants, or of *Agropyron junceum*, or of *Ammophila arundinacea*, and only reaches the intermediate associations of dune pasture plants or of dune marsh plants. The formation of the muddy salt marshes begins as an open association of Salicornia, and, after reaching an intermediate association of halophilous plants, the salt marshes are reclaimed. The author concludes that in a small area, like England, the plant associations are determined much more by edaphic factors than by climatic conditions.—J. M. C.

Toxicity of solutions.—To determine if the fact discovered by NÄGELI, that insoluble solid substances placed in poisonous solutions in which algae are growing reduce the toxicity of the solutions, holds also for fungi, Miss FITCH[15] has investigated the action of insoluble substances upon media in which fungi were grown. Penicillium and Aspergillus were grown in pure cultures in beet decoction, in prune decoction, and in bouillon to which sulfuric acid had been added, making concentrations of $n/4$, $n/8$, $n/16$, $n/32$, $n/64$, and $n/128$. It was found that such substances as glass in different degrees of fineness, sand, and filter paper reduce the degree of toxicity of the poisonous solutions. For example, in cultures of Aspergillus in beet decoction, $n/64$ and $n/128$ H_2SO_4 showed stimulation, while $n/32$ was near the border line of beginning toxicity; but with the addition of glass $n/32$ showed the greatest stimulation of growth of the series, and a concentration as high as $n/16$ still showed marked stimulation. All other experiments showed results of the same nature, thus establishing the fact that the principle of NÄGELI holds in this case, as it has been shown to hold for flowering plants. Such results were to be expected, since the modifying action of the solid substances is exerted on the solution and not on the organisms growing therein.—H. HASSELBRING.

Glycogen and sporulation in yeast.—KOHL[16] finds that glycogen is more abundant in actively budding cells of *Saccharomyces cerevisiae* which he examined than it is in the resting cells. In view of this fact he believes that glycogen is not exclusively a reserve product, but that it represents an intermediate product in the formation of alcohol from sugar. He suggests that glycogen is broken down to glucose and isomaltose, which undergo splitting into alcohol and CO_2 by the action of zymase, and that the hexoses consequently first undergo transformation into glycogen in the process of alcoholic fermentation. In other fungi also KOHL finds that glycogen is not primarily a storage product; it does not appear in the spores of the Mucorales nor in sclerotia until germination or growth has begun. In the same paper KOHL gives some preliminary observations on the sporulation in yeast. The young spores are frequently surrounded by fatty substances in the early stages of formation. The nucleus divides amitotically both in budding and in spore formation, and one to four spores are formed. In the first case the cell nucleus becomes the spore nucleus directly. Often a nucleus which does not produce a spore remains in the cytoplasm of the mother cell after the spores are formed.—H. HASSELBRING.

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[15] FITCH, RUBY, The action of insoluble substances in modifying the effect of deleterious agents upon the fungi. Ann. Mycol. **4**:313–322. 1906.

[16] KOHL, F. G., Ueber das Glykogen und einige Erscheinungen bei der Sporulation der Hefe. Ber. Deutsch. Bot. Gesells. **25**:74–85. *pl. 1. figs. 2.* 1907.

Supernumerary pollen grains of Fuchsia.—BEER[17] has investigated Fuchsia, whose pollen mother cells are recorded as producing five to fourteen microspores. He found frequently six to ten microspores within a single cell, and a study of the nuclear divisions led to the conclusion that these high numbers are due to the occurrence of irregularities in the distribution of the chromosomes during anaphase, as described by JUEL for Hemerocallis. The chromosomes move very unevenly toward the poles, and some, either singly or in groups, lag behind and often become cut off entirely from the two main chromosome groups. Usually these separated chromosomes give rise to distinct nuclei, which vary in size according to the number of chromosomes they contain. During the second division the small as well as the large nuclei produce distinct spindles and divide. The second division is much more regular than the first, and no supernumerary nuclei were observed to originate at this stage. The small pollen grains are as definitely organized as the large ones, so far as the usual walls and their composition are concerned.—J. M. C.

Embryo sac of Peperomia.—JOHNSON[18] has discovered in a delicate, shade-loving, Jamaican species of Peperomia (*P. hispidula*) an interesting variation of the well-known situation in *P. pellucida*. There is a single hypodermal archesporial cell, which cuts off a tapetal cell. The mother cell develops the embryo sac directly, the first four free nuclei being "arranged in a perfect tetrad." At the next division a distinct polarity is developed, two nuclei passing to the micropylar end of the sac, and the other six grouping at the antipodal end. At the next division the Peperomia condition of sixteen free nuclei is reached, four being micropylar and twelve antipodal. A well-defined egg and one synergid are organized, the two remaining micropylar nuclei passing toward the center of the sac, where they encounter the twelve antipodal nuclei. The whole group of fourteen nuclei fuses into one great fusion nucleus. The division of this fusion nucleus is accompanied by wall-formation, and an endosperm tissue of about forty cells is developed.—J. M. C.

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[17] BEER, RUDOLF, The supernumerary pollen grains of Fuchsia. Annals of Botany **21**:305–307. 1907.

[18] JOHNSON, D. S., A new type of embryo sac in Peperomia. Johns Hopkins Univ. Circ. **1907**:no. 3. 19–21. *pls. 5–6.*